

REMARKS

Reconsideration and allowance of this application are respectfully requested in light of the above amendments and the following remarks.

Claims 14-17 and 19-24 have been amended, and claims 25-30 have been canceled. Support for the amendments is provided, for example, in Figs. 15-18 and paragraphs [0130]-[0144] and [0172]-[0178] of the published specification. The amendments were not presented earlier due to the unforeseeability of the remarks presented in the Final Rejection. (It should be noted that references herein to the specification and drawings are for illustrative purposes only and are not intended to limit the scope of the invention to the referenced embodiments.)

Claims 14, 16, 17, 20-25, and 27-30 were rejected, under 35 USC §102(e), as being anticipated by Karjalainen (US 2002/0176438). Claims 15, 18, 19, and 26 were rejected, under 35 USC §103(a), as being unpatentable over Karjalainen (US 2002/0176438) in view of Atarashi et al. (US 7,298,721). To the extent that these rejections may be deemed applicable to the amended claims presented herein, the Applicants respectfully traverse based on the points set forth below.

Claim 14 defines a radio base station apparatus that:

- (1) encodes a plurality of types of control information, for an uplink packet transmission, using symbol patterns that differ between the plurality of types of control information and
- (2) spreads the plurality of types of control information after the encoding process using a single spreading code that is common to the plurality of types of control information.

By contrast to the Applicants' claimed subject matter, Karjalainen discloses, in Fig. 4, a radio transmitter that spreads each of a plurality of control channels with a different spreading

code (see Karjalainen paragraph [0001] and page 5, left column, lines 6-22). After the spreading, the chips are scrambled (i.e., multiplied) by a base-station specific (i.e., fixed) scrambling code, modulated, and combined (i.e., multiplexed) in block 408 (see page 5, left column, lines 24-29, and page 6, right column, lines 5-6).

Thus, Karjalainen discloses spreading each channel with a different and orthogonal spreading code, scrambling each spread signal with the same scrambling code, modulating the scrambled and spread signals, and multiplexing the modulated signals. The Final Rejection proposes that Karjalainen's use of a single scrambling code corresponds to the Applicants' claimed symbol patterns in that applying a single spreading code to different bit sequences will generate a plurality of symbol patterns (see Final Rejection page 10, lines 8-15).

The Applicants respectfully submit that the Final Rejection has misconstrued the claimed symbol pattern to have the same meaning as a symbol. However, the Applicants note that a symbol pattern (also referred to in the art as a constellation pattern) represents all symbols that may be formed to represent sequences of bits for a particular type of modulation. For example, BPSK modulation has a symbol pattern (constellation pattern) comprising two different symbols, QPSK modulation has a symbol pattern (constellation pattern) comprising four different symbols, 8-PSK modulation has a symbol pattern (constellation pattern) comprising eight different symbols, and 64 QAM modulation has a symbol pattern (constellation pattern) comprising 64 different symbols. Thus, a symbol and a symbol pattern are not synonymous; instead, a symbol pattern identifies every symbol that a particular form of modulation may create (see <http://www.freepatentsonline.com/5654986.html> for a more detailed discussion).

Accordingly, it is submitted that the Final Rejection's proposal that applying Karjalainen's single spreading code to different bit sequences will generate a plurality of symbol patterns (see Final Rejection page 10, lines 8-15) is incorrect. Instead, applying Karjalainen's single spreading code to different bit sequences will generate different spread sequences, and, when modulated, may generate different symbols of a single symbol pattern.

In summary, it is clear that Karjalainen does not disclose applying multiple modulation schemes to data communicated in a packet. Thus, Karjalainen cannot disclose the Applicants' claimed subject matter of encoding a plurality of types of control information, for use in a packet transmission, using symbol patterns that differ among the types of control information. Stated more simply, Karjalainen does not disclose modulating (encoding data to create a symbol of a symbol pattern is inherently a process of modulation) different information with different symbol patterns.

Moreover, as mentioned previously, Karjalainen discloses spreading information, scrambling the spread signal, and modulating the scrambled signal. The Applicants' claimed subject matter recites modulating (i.e., the recited encoding operation is inherently a modulation process, as mentioned above) information and then spreading the modulated information. Thus, the Applicants' claimed subject matter performs the operations of modulation and spreading in the reverse order to that disclosed by Karjalainen.

Furthermore, Karjalainen discloses spreading each of multiple channels with a different and orthogonal spreading code (see Karjalainen paragraph [0001], and page 5, lines 24-27 of right column), whereas the Applicants' claimed subject matter spreads multiple types of control

information, after this information has been encoded, with a single spreading code that is common to the multiple types of control information.

Accordingly, the Applicants submit that Karjalainen does not anticipate the subject matter defined by claim 14. Independent claims 15-17, 20, and 22-24 now similarly recite the above-mentioned subject matter distinguishing apparatus claim 14 from Karjalainen, although claims 22 and 23 do so with respect to methods and claims 20 and 23 do so with respect to an inverse operation (e.g., demultiplexing) of the multiplexing inherently occurring in claim 14. As pertains to claim 15, Atarashi is not cited in the Final Rejection for supplementing the teachings of Karjalainen with respect to the above-mentioned subject matter distinguishing claim 14 from Karjalainen. Therefore, the rejections applied to claims 15, 18, and 19 are deemed to be obviated and allowance of claims 14-17, 20, and 22-24 and all claims dependent therefrom is considered to be warranted.

To promote a better understanding of the patentable distinctions of the instant claimed subject matter over the applied references, the applicants provide the following additional remarks.

Karjalainen discloses, in Fig. 4, a radio transmitter that spreads each of a plurality of control channels with a different spreading code (see Karjalainen paragraph [0001] and page 5, left column, lines 6-22). After the spreading, the chips are scrambled (i.e., multiplied) by a base-station specific (i.e., fixed) scrambling code, modulated, and combined (i.e., multiplexed) in block 408 (see page 5, right column, lines 24-29, and page 6, right column, lines 5-6). Thus, Karjalainen discloses spreading each channel with a different and orthogonal spreading code (see

Karjalainen paragraph [0001]), scrambling each spread signal with the same scrambling code, modulating the scrambled and spread signals, and multiplexing the modulated signals.

The Final Rejection proposes that Karjalainen discloses a plurality of symbol patterns (see Final Rejection, page 6). Applicants respectfully disagree. At page 5, paragraph [0033], Karjalainen discloses the use of “a base-station-specific scrambling code” (see Karjalainen page 5, right column, lines 25-26). Karjalainen does not disclose or suggest using “a plurality of mutually uncorrelated symbol patterns” as now specified in the claims.

Independent claim 14 now recites a radio base station apparatus that communicates with a communication terminal, the radio base station apparatus comprising: an encoder that has a pattern table storing a plurality of mutually uncorrelated symbol patterns and that encodes a plurality of types of control information for a single communication terminal for use in uplink packet transmission, using symbol patterns that differ between the types of control information; and a spreader that spreads the plurality of types of control information after the encoding, using a single spreading code common between the plurality of types of control information.

Independent claim 15 now recites a radio base station apparatus that communicates with a communication terminal, the radio base station apparatus comprising: a first transmission signal former that spreads transmission data for a first communication terminal using a first spreading code assigned to the first communication terminal and forms a first dedicated channel signal for the first communication terminal, and that spreads transmission data for a second communication terminal using a second spreading code assigned to the second communication terminal and forms a second dedicated channel signal for the second communication terminal; and a second transmission signal former that multiplexes a plurality of types of first control information for the

first communication terminal and a plurality of types of second control information for the second communication terminal using a third spreading code, which is provided for common use by the first and second communication terminals, and a plurality of symbol patterns that differ between the plurality of types of first control information and between the plurality of types of second control information and that forms transmission signals for the first and second communication terminals, wherein the second transmission signal former comprises an encoder that has a pattern table storing a plurality of mutually uncorrelated symbol patterns and that encodes the plurality of types of first control information and the plurality of types of second control information, using symbol patterns that differ between the types of control information.

Independent claim 16 now recites a radio base station apparatus that communicates with a communication terminal, the radio base station apparatus comprising a multiplexer that multiplexes a plurality of types of control information for a plurality of communication terminals for use in uplink packet transmission, using a spreading code and symbol patterns in a plurality of combinations, the plurality of types of control information being provided per communication terminal, wherein the multiplexer comprises: an encoder that has a pattern table storing a plurality of mutually uncorrelated symbol patterns and that encodes a plurality of types of control information for a single communication terminal for use in uplink packet transmission, using symbol patterns that differ between the types of control information; and a spreader that spreads the plurality of types of control information after the encoding, using a single common spreading code.

Independent claim 17 now recites a radio network controller apparatus comprising an assigner that assigns a spreading code and symbol patterns in a plurality of combinations to a

plurality of types of control information for a plurality of communication terminals for use in uplink packet transmission, the plurality of types of control information being provided per communication terminal, wherein the assigner assigns a single spreading code and symbol patterns that differ between the types of control information, to the plurality of types control information for a single communication terminal.

Independent claim 20 now recites a communication terminal apparatus comprising: a despreader that despreads a signal from a radio base station apparatus using a single spreading code provided for a single communication terminal apparatus; a decoder that extracts a plurality of types of control information using symbol patterns provided from the radio base station apparatus, the plurality of types of control information for the communication terminal apparatus being multiplexed in the signal using a plurality of symbol patterns; and a transmission signal former that forms uplink transmission packets based on the plurality of types of control information extracted by the decoder, wherein the decoder selects the symbol patterns provided from the radio base station apparatus from a plurality of mutually uncorrelated symbol patterns, and decodes the signal after the despreading using the selected symbol patterns.

Independent claim 22 now recites a transmission signal generation method comprising: selecting symbol patterns that differ between types of control information, from a plurality of mutually uncorrelated symbol patterns stored in a pattern table, and encoding a plurality of types of control information for a single communication terminal using the selected symbol patterns; and spreading the plurality of types of control information after the encoding, using a single common spreading code.

Independent claim 23 now recites, a method of receiving a plurality of types of control information for a communication terminal, the method comprising: despreads a received signal using a single spreading code common to the plurality of types of control information; and selecting symbol patterns provided from a radio base station apparatus, from a plurality of mutually uncorrelated symbol patterns, and decoding the signal after the despreads using the selected symbol patterns.

Independent claim 24 now recites, a radio communication system that transmits a plurality of types of control information for a single communication terminal for use in uplink packet transmission, the radio communication system comprising: a radio network controller apparatus; a radio base station apparatus; and a mobile station apparatus, wherein: the radio network controller apparatus designates a plurality of symbol patterns, which differ between the plurality of types of control information, and a spreading code common to the plurality of types of control information for the radio base station apparatus and the mobile station apparatus; the radio base station apparatus transmits the plurality of types of control information to the mobile station apparatus using the plurality of symbol patterns and the spreading code; and the mobile station apparatus extracts the plurality of types of control information using the plurality of symbol patterns and the spreading code, wherein the control station apparatus commands the radio base station apparatus and the communication terminal apparatus to use different symbol patterns between the types of control information, from a plurality of mutually uncorrelated symbol patterns.

Some of the claims presented herein include, *inter alia*, a plurality of mutually uncorrelated symbol patterns. In some of the claims, a plurality of types of control information is

encoded using symbol patterns that differ between the types of control information. In some of the claims, a spreader is provided that spreads the plurality of types of control information after the encoding, using a single spreading code common between the plurality of types of control information. As discussed in detail, for example, in the aforementioned portions of the application providing support for the amendments, the combinations of features recited in the claims provide benefits and improvements over prior radio communication techniques by reducing system complexity and improving communication.

As discussed in more detail hereinafter, Applicants respectfully submit that Karjalainen does not disclose or suggest the features set forth in the independent claims presented herein.

Now, referring to independent claims 14-16, Karjalainen does not disclose or suggest the features of claims 14-16 of providing a pattern table that stores a plurality of mutually uncorrelated symbol patterns and encoding a plurality of types of control information for a single communication terminal for use in uplink packet transmission, using symbol patterns that differ between types of control information.

Referring to independent claim 22, Karjalainen also fails to disclose or suggest the features of claim 22 of selecting symbol patterns that differ between types of control information, from a plurality of mutually uncorrelated symbol patterns stored in a pattern table, and encoding a plurality of types of control information for a single communication terminal using the selected symbol patterns.

Referring to independent claim 17, Karjalainen also fails to disclose or suggest the features of claim 17 of providing an assigner that assigns a single spreading code and symbol

patterns that differ between types of control information, to a plurality of types control information for a single communication terminal.

Referring to independent claim 20, Karjalainen also fails to disclose or suggest the features of claim 20 of providing a decoder that selects symbol patterns provided from a radio base station apparatus from a plurality of mutually uncorrelated symbol patterns, and that decodes a signal after the despreading using the selected symbol patterns.

Referring to independent claim 23, Karjalainen also fails to disclose or suggest the features of claim 23 of selecting symbol patterns provided from a radio base station apparatus, from a plurality of mutually uncorrelated symbol patterns, and decoding a signal after the despreading using the selected symbol patterns.

Referring to independent claim 24, Karjalainen also fails to disclose or suggest the features of claim 24 of commanding a radio base station apparatus and a communication terminal apparatus to use different symbol patterns between the types of control information, from a plurality of mutually uncorrelated symbol patterns.

As explained above, Karjalainen fails to disclose or suggest the combinations of features of the claimed invention defined in amended independent claims 14-17, 20, 22, 23, and 24. Atarashi does not provide the features that are missing in Karjalainen. Therefore, it is submitted that allowance of claims 14-17, 20, 22, 23, and 24 and all claims dependent therefrom is deemed to be warranted.

In view of the above, it is submitted that this application is in condition for allowance and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the

examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

/James Edward Ledbetter/

Date: July 16, 2009
JEL/DWW/att

James E. Ledbetter
Registration No. 28,732

Attorney Docket No. 009289-04195
Dickinson Wright PLLC
1875 Eye Street, NW, Suite 1200
Washington, DC 20006
Telephone: (202) 659-6966
Facsimile: (202) 659-1559